



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/676,905	09/30/2003	Jay W. Dawson	IL-11186	8068

7590 11/01/2005

Alan H. Thompson
Deputy Laboratory Counsel For Intellectual Prop.
Lawrence Livermore National Laboratory
P.O. Box 808, L-703
Livermore, CA 94551

EXAMINER

SONG, SARAH U

ART UNIT	PAPER NUMBER
----------	--------------

2874

DATE MAILED: 11/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

DETAILED ACTION

1. Applicant's communication filed on August 15, 2005 has been carefully considered and placed of record in the file. Claims 1, 4-6, 8-13, 16, 20, 21, 23-25, 27 and 28 are amended. Claims 1-28 are pending.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. **Claims 1-3, 5, 7, 14, 15, 21, 22, 24 and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Richardson et al. (U.S. Patent Application Publication 2002/0018630 previously relied upon).**

4. Regarding claims 1 and 21, Richardson et al. discloses an optical fiber having at least three distinct, concentric cylindrical regions 22, 24, and 26 having corresponding refractive indices of n_1 , n_2 and n_3 and corresponding diameters d_1 , d_2 and d_3 where $n_2 > n_1 > n_3$ and $d_3 > d_2 > d_1$ and at least one of the regions contains an optically active rare earth ion.

5. Regarding claims 2 and 21, Richardson et al. further discloses means for optically pumping said optical fiber (pump 980nm), said apparatus further comprising means L1 for coupling signal light into said optical fiber to be amplified.

6. Regarding claims 3 and 22, the means for optically pumping said optical fiber includes a laser diode or laser diode array. Paragraph [0055].

Art Unit: 2874

7. Regarding claims 5 and 24, said optical fiber is further surrounded by a region with refractive index $n_4 < n_3$ to provide a multi-mode waveguide. See Figure 2.
8. Regarding claims 7 and 26, the optically active rare earth ion is selected from one of the following Yb^{3+} , Nd^{3+} , Sm^{3+} , Tm^{3+} , Er^{3+} , Ho^{3+} , Dy^{3+} or Pr^{3+} .
9. Regarding claims 14, Richardson et al. further comprising means M2 for providing feedback to said apparatus.
10. Regarding claim 15, means for providing feedback include at least one mirror M2 configured to reflect a portion of light emitted optical fiber back into said optical fiber.
11. **Claims 1, 8, 21 and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Shukunami et al. (U.S. Patent 5,778,129).**
12. Regarding claims 1 and 21, Shukunami et al. discloses an optical fiber having at least three distinct, concentric cylindrical regions 24, 23, and 22 having corresponding refractive indices of n_1 , n_2 and n_3 and corresponding diameters d_1 , d_2 and d_3 where $n_2 > n_1 > n_3$ and $d_3 > d_2 > d_1$ and at least one of the regions contains an optically active rare earth ion.
13. Regarding claims 8 and 27, said optical fiber comprises fused silica in region 22 and fused silica with germania, phosphorous, fluorine or alumina in regions 24 and 23 (column 6, lines 20-36).
14. **Claims 1 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Inagaki et al. (U.S. Patent 5,799,125).**
15. Regarding claim 1, Inagaki et al. discloses an optical fiber having at least three distinct, concentric cylindrical regions 12, 14 and 16 having corresponding refractive indices of n_1 , n_2 and

Art Unit: 2874

n_3 and corresponding diameters d_1 , d_2 and d_3 where $n_2 > n_1 > n_3$ and $d_3 > d_2 > d_1$ and at least one of the regions contains an optically active rare earth ion.

16. Regarding claim 11, said rare earth ion is confined to region 12 or a concentrically located sub-region of region 12. See Abstract.

Claim Rejections - 35 USC § 103

17. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

18. **Claims 4, 9, 10, 12, 13, 16-20, 23 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Richardson et al.**

19. Regarding claims 4 and 23, Richardson et al. does not expressly disclose wherein n_1 , n_2 and n_3 and d_1 , d_2 and d_3 are chosen to provide a fundamental optical mode at the wavelength of said signal light such that the electric field of said fundamental optical mode at the center of said cylindrical regions is approximately the same strength as the electric field at the outer edge of the second region. However, it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. See MPEP 2144.05. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select appropriate values for n_1 , n_2 and n_3 and d_1 , d_2 and d_3 to provide a fundamental optical mode at the wavelength of said signal light such that the electric field of said fundamental optical mode at the center of said cylindrical regions is approximately the same strength as the electric field at the outer edge of the second region in order to optimize the fiber characteristics.

Art Unit: 2874

20. Regarding claims 9 and 10, Richardson et al. does not expressly disclose the claimed values for n_1 , n_2 and n_3 and d_1 , d_2 and d_3 . However, it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. See MPEP 2144.05.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select appropriate values for n_1 , n_2 and n_3 and d_1 , d_2 and d_3 in order to optimize the fiber characteristics.

21. Regarding claims 12 and 28, Richardson et al. does not expressly disclose the apparatus wherein said fiber is preferentially wound around a cylindrical mandrel of radius R , where R is chosen such that there is minimal bend induced attenuation for the desired waveguide mode propagating in the core of the fiber, but significant attenuation for all other modes at the signal wavelength. However, it is well known in the art to wind an optical fiber amplifier around a mandrel to attenuate undesired modes. Furthermore, it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. See MPEP 2144.05. Therefore, it would have been obvious to one having ordinary skill in the art to preferentially wind the fiber around a mandrel of radius R in order to optimize coupling and transmission characteristics of the fiber.

22. Regarding claims 13 and 16-20, Richardson et al. does not expressly disclose an ultra-short signal pulse and a means for temporally stretching the signal pulse, wherein the stretched pulse is greater than 10 times longer in time than the signal pulse, an optical isolator, a Q-switch, polarizers, a parallel grating pair, or a non-linear crystal. Ultra-short pulses, means for stretching signal pulses, optical isolators, Q-switches, polarizers, parallel grating pairs and non-linear crystals are well known in the art. One of ordinary skill in the art would have found it obvious to

Art Unit: 2874

provide the claimed features since applicant has not disclosed any criticality for the claimed features.

23. Claims 6 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Richardson et al. as applied to claim 1 or 21 as applicable above, and further in view of Po (U.S. Patent Application Publication 2004/0156606).

24. Regarding claims 6 and 25, Richardson et al. does not expressly disclose the cylindrical symmetry of the third region to be deliberately broken via de-centering of the region from the other regions or by altering the outside shape of the region.

25. Po discloses an optical fiber laser/amplifier wherein the cylindrical symmetry of the third region to be deliberately broken via de-centering of the region from the other regions.

26. Richardson et al. and Po are analogous art as pertaining to fiber amplifiers.

27. It would have been obvious to one having ordinary skill in the art at the time the invention was made to deliberately break the asymmetry in order to optimize pump characteristics of the fiber as taught by Po. See Paragraph [0067].

Response to Arguments

28. Applicant's arguments filed August 15, 2005 have been fully considered but they are not persuasive. Regarding Richardson et al., Applicant states that Richardson et al. does not teach distinct regions as claimed as shown by a gradually increasing and decreasing refractive index band 24. Examiner respectfully disagrees. Applicant's claim merely requires three concentric regions meeting the claimed refractive index relationships. Richardson et al. clearly discloses three distinct regions, as indicated by reference numerals 22, 24 and 26, that meet the claimed refractive index profile.

Art Unit: 2874

29. Regarding Shukunami et al., Applicant states that Shukunami et al. teaches a refractive index profile of $n_3 > n_1 > n_2$. However, Shukunami et al. also meets the claimed refractive index profile of $n_2 > n_1 > n_3$, where regions 24, 23 and 22 are concentric cylindrical regions, and region 24 has refractive index n_1 , region 23 has a refractive index n_2 and region 22 has a refractive index n_3 .

30. Regarding claim Inagaki et al., in response to applicant's argument that the reference does not teach the fiber design that propagates a flat top mode, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. Furthermore, it is noted that the features upon which applicant relies (i.e., the intended use) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Conclusion

31. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37


Art Unit: 2874

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sarah Song whose telephone number is 571-272-2359. The examiner can normally be reached on M-Th 7:30am - 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on 571-272-2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Sarah Song
Patent Examiner
Group Art Unit 2874